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Mobile Penetration Testing - Final Project

Lap Task:

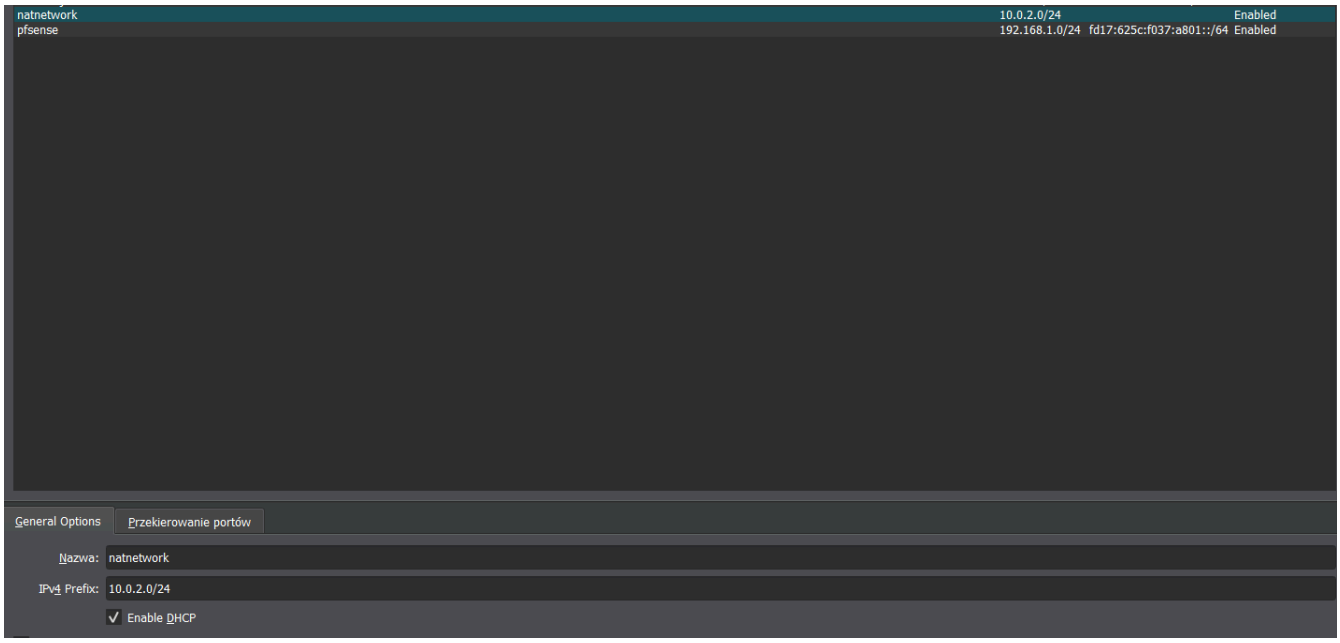
Execute various attack methods by bypass the login screen and send money to your account over 4000$

Part 1 – Virtual Box and Linux Network Configuration

1. **Create a new NAT network in your VirtualBox.**

I created a new NAT network in VirtualBox

- In VirtualBox settings, I configured a NAT network with the 10.0.2.0/24 subnet. I ensured that DHCP was enabled so devices in the network could automatically receive IP addresses.



2. **Configure Static IP in your Linux machine.**
3. **Start your Linux machine and Configure Static IP.**

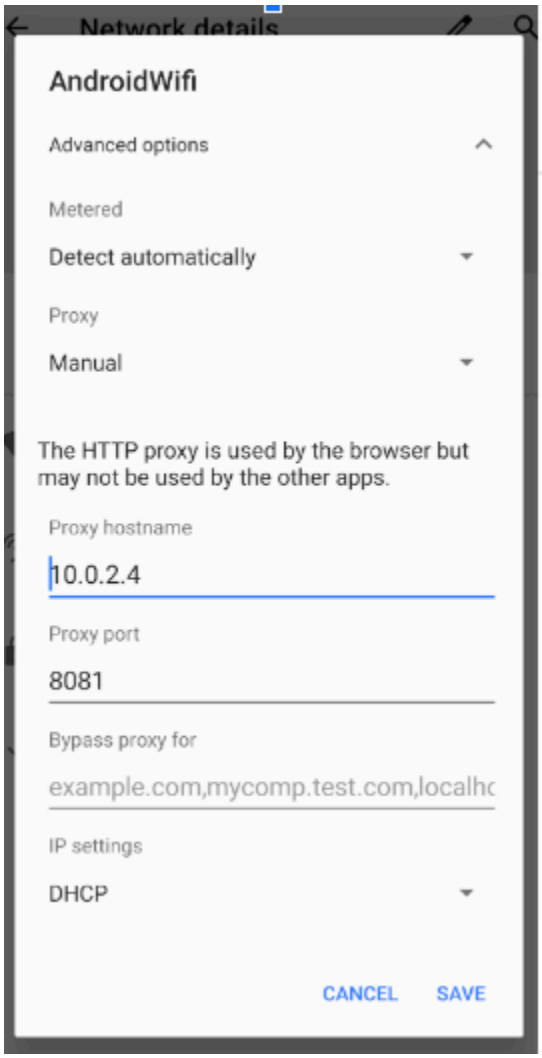
I set a static IP address in Linux

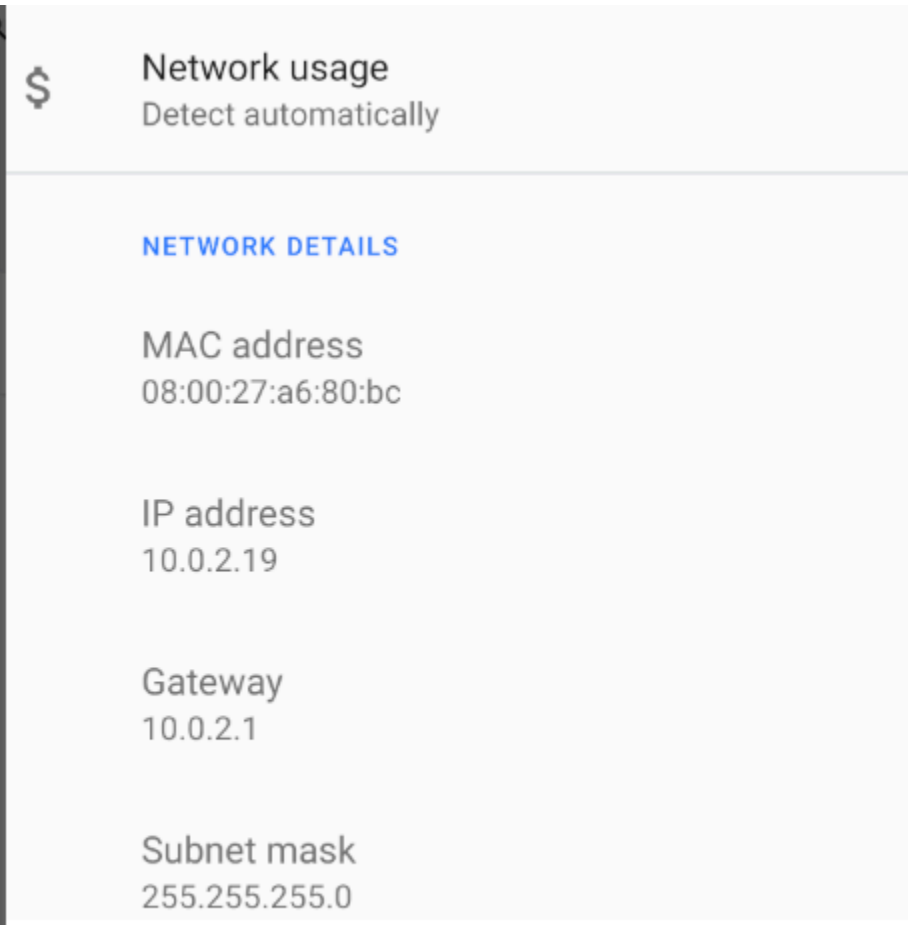
- I assigned a static IP address (10.0.2.4) to the `eth0` interface on my Kali Linux machine. I modified the `/etc/network/interfaces` file to make these settings persistent across reboots and restarted the networking service.

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

source /etc/network/interfaces.d/*

#static ip adress on eth0
auto eth0
iface eth0 inet static
  address 10.0.2.4
  netmask 255.255.255.0
  gateway 10.0.2.1

# The loopback network interface
auto lo
iface lo inet loopback
```

Part 2 – Genymotion Network Configuration

1. **Open VirtualBox and go to your Mobile Virtual Phone Machine Properties.**





Part 3 – Creating Docker Env and Installing APK

1. **At your Linux machine, install Docker, Apache, and SQL Server.**

I installed Docker and verified its status

- I installed Docker and ran `docker ps` to check for running containers. Afterward, I used `docker-compose` with the provided `docker-compose.yml` file to spin up a container running Apache and MariaDB.

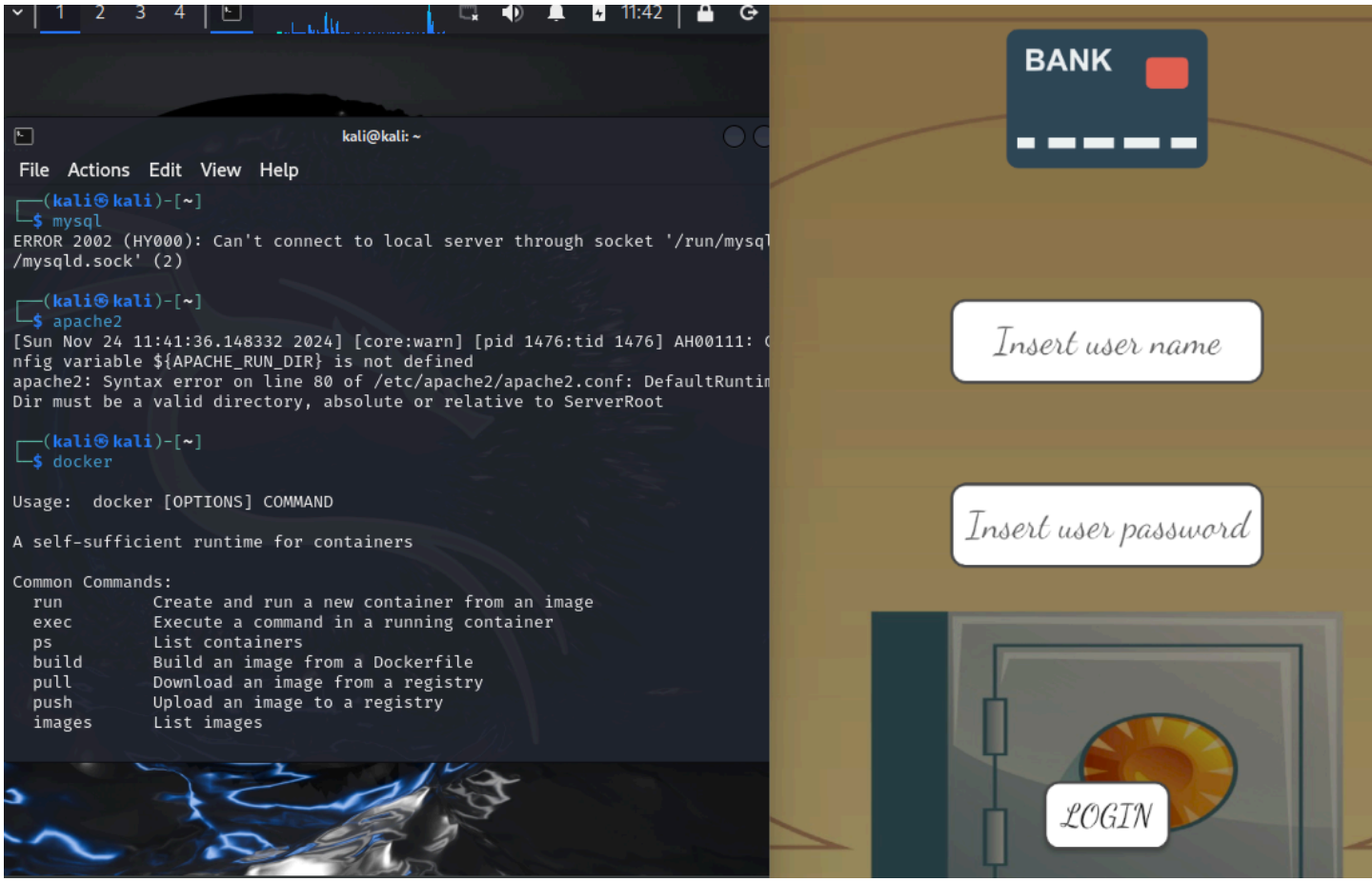
```
┌──(root㉿kali)-[/home/kali]
└─# docker --version && apache2 -v && systemctl status mysql
Docker version 26.1.5+dfsg1, build a72d7cd
Server version: Apache/2.4.62 (Debian)
Server built:   2024-07-18T02:56:52
● mariadb.service - MariaDB 11.4.2 database server
     Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; p
     Active: active (running) since Mon 2024-11-25 04:29:53 EST; 31s ago
```

I ensured the database was accessible

The application required a MySQL database running on port 8080. I modified the Docker network configuration to ensure compatibility with the app's requirements and verified that the database was running correctly.

```
    container.image_config['ContainerConfig'].get('Volumes') or {}
    ~~~~~~~~~~~~~~~~~~~~~~~~^^^^^^^^^^^^^^^^^^^^
KeyError: 'ContainerConfig'

┌──(root㉿kali)-[/home/kali/Desktop/MobileFinalBank/Bank-Docker]
└─# PORT1=8080 docker-compose up
Starting b20df07cce9d_bank-docker_apache_1 ... done
Attaching to b20df07cce9d_bank-docker_apache_1
b20df07cce9d_bank-docker_apache_1 |  * Restarting Apache httpd web server apach AH00558: apache2: C
ng 172.19.0.2. Set the 'ServerName' directive globally to suppress this message
b20df07cce9d_bank-docker_apache_1 |                                          [ OK ]
b20df07cce9d_bank-docker_apache_1 |  * Starting MariaDB database server m[ OK ]
b20df07cce9d_bank-docker_apache_1 |  * Restarting Apache httpd web server apach AH00558: apache2: C
ng 172.19.0.2. Set the 'ServerName' directive globally to suppress this message
b20df07cce9d_bank-docker_apache_1 |                                          [ OK ]
b20df07cce9d_bank-docker_apache_1 | ERROR 1007 (HY000) at line 1: Can't create database 'studentsDB
b20df07cce9d_bank-docker_apache_1 | ERROR 1396 (HY000) at line 1: Operation CREATE USER failed for
```

2. Install APK to Genymotion and run the app.



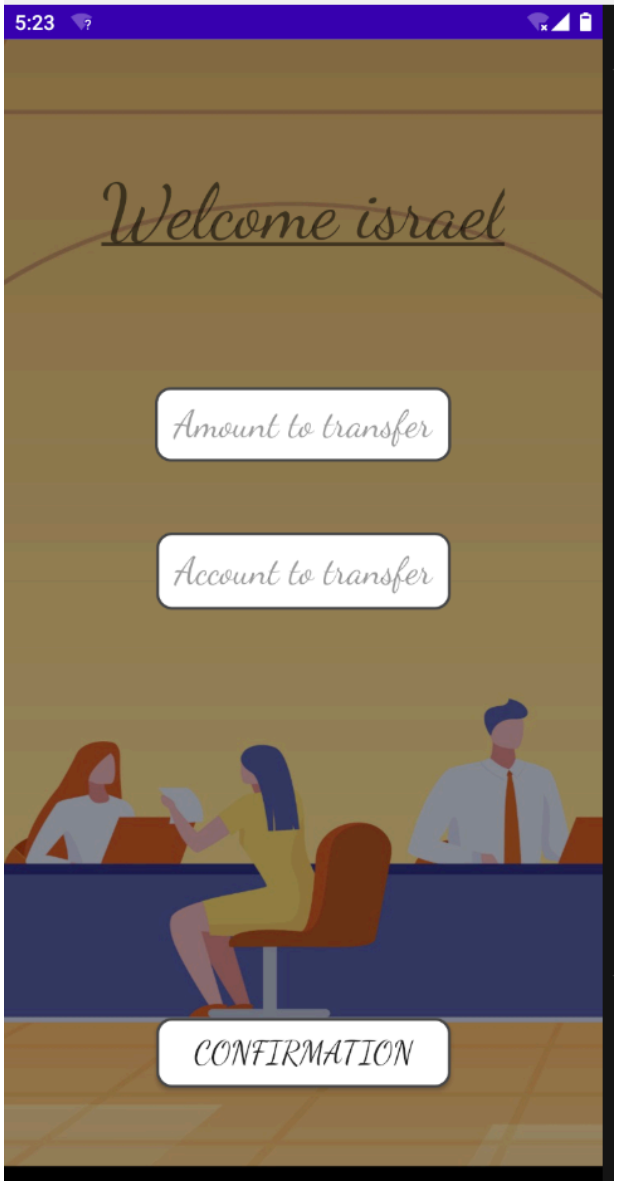
Part 4 – Solution

1. **Perform Boolean SQLi.**

2. **Open ADB with Logcat.**

```
11-24 15:25:16.966   388   388 E android.hardware.graphics.allocator@2.0-service: open_ve
11-24 15:25:16.971  2377  2377 D stock → : israel isis447
11-24 15:25:16.971  2377  2377 D stock → : nadav shna467
11-24 15:25:16.971  2377  2377 D stock → : asaf moas823
11-24 15:25:16.971  2377  2377 D stock → : eliran klel139
11-24 15:25:16.972  2377  2377 D stock → : oded ocod669
11-24 15:25:16.972   388   481 E android.hardware.graphics.allocator@2.0-service: open_ve
ectory
```

3. **Go back to the Login Screen and make a legal login.**



4. **Transfer $4000 to your account.**

   "Sorry.. this bank is for students.

   limit is 50 $ for transfer"

5. Use APKTOOL to decompile the app and get the smali code.

I decompiled the APK file

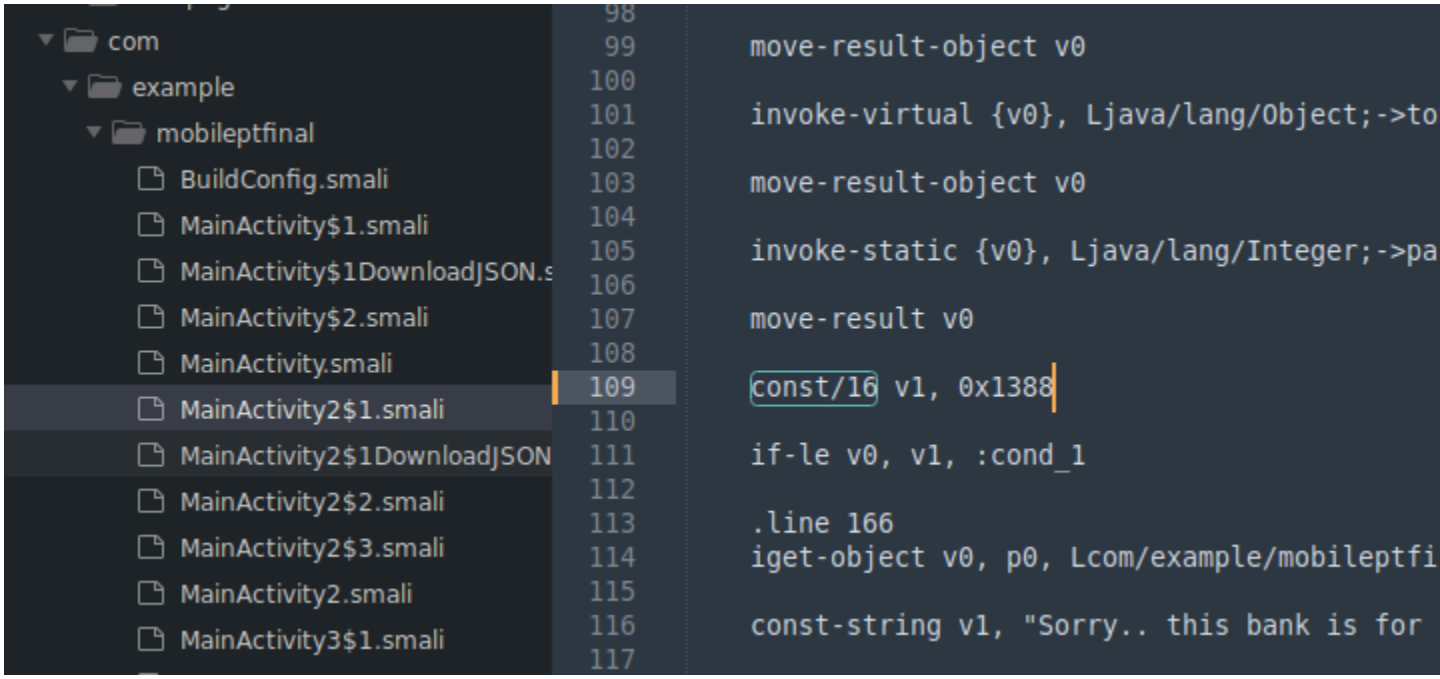
- Using APKTool, I decompiled the Android application to access its source files. This allowed me to inspect the application's logic and identify the code that enforced a transfer limit of $50 for student accounts.

```
┌──(kali㉿kali)-[~/Desktop/MobileFinalBank]
└─$ java -jar apktool.jar d MobileBank2.apk -o decompiled_apk

Picked up _JAVA_OPTIONS: -Dawt.useSystemAAFontSettings=on -Dswing.aatext=true
I: Using Apktool 2.5.0 on MobileBank2.apk
I: Loading resource table ...
I: Decoding AndroidManifest.xml with resources ...
I: Loading resource table from file: /home/kali/.local/share/apktool/framewor
k/1.apk
I: Regular manifest package ...
I: Decoding file-resources ...
I: Decoding values */* XMLs ...
I: Baksmaling classes.dex ...
I: Baksmaling classes2.dex ...
I: Copying assets and libs ...
I: Copying unknown files ...
I: Copying original files ...

┌──(kali㉿kali)-[~/Desktop/MobileFinalBank]
└─$
```

6. Open the smali code in `MainActivity2`.

I modified the application logic

- I found the relevant smali file that implemented the transfer limit. I adjusted the code to bypass this restriction and allow transactions exceeding $50.
- While reviewing the smali files, I identified the logic that enforced the $50 transfer limit. Interestingly, this value was stored in hexadecimal format (`0x32`), which corresponds to 50 in decimal. I modified this value to `0xFA0`, which corresponds to $4000 in decimal. This change effectively bypassed the original transfer limit.



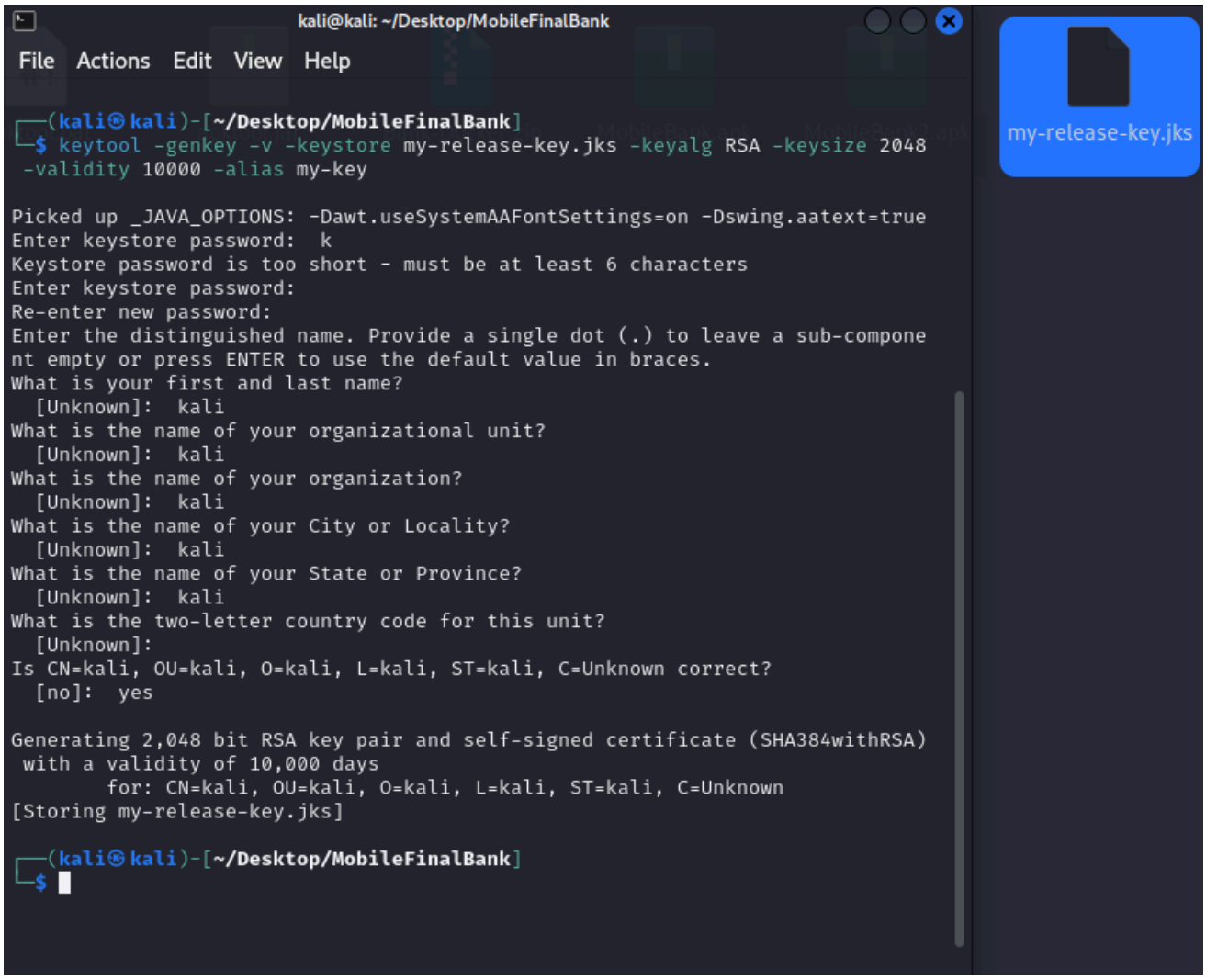
7. Use APKTOOL to rebuild the app.

I rebuilt and signed the modified APK

- After making the changes, I rebuilt the APK using APKTool. I then used the `uber-apk-signer` tool to sign the modified APK, ensuring it could be installed on the Android device.

```
┌──(kali㉿kali)-[~/Desktop/MobileFinalBank]
└─$ java -jar apktool.jar b decompiled_apk -o MobileBank_apk

Picked up _JAVA_OPTIONS: -Dawt.useSystemAAFontSettings=on -Dswing.aatext=true
I: Using Apktool 2.5.0
I: Checking whether sources has changed ...
I: Smaling smali folder into classes.dex ...
I: Checking whether sources has changed ...
I: Smaling smali_classes2 folder into classes2.dex ...
I: Checking whether resources has changed ...
I: Building resources ...
I: Building apk file ...
I: Copying unknown files/dir ...
I: Built apk ...

┌──(kali㉿kali)-[~/Desktop/MobileFinalBank]
└─$ sS
```

8. Sign the APK.



And i signed apk with

java -jar uber-apk-signer-1.2.1.jar --apks MobileBank3.apk

Then check with

apksigner verify MobileBank3.apk

9. Re-install the app on your device.

I installed the modified APK

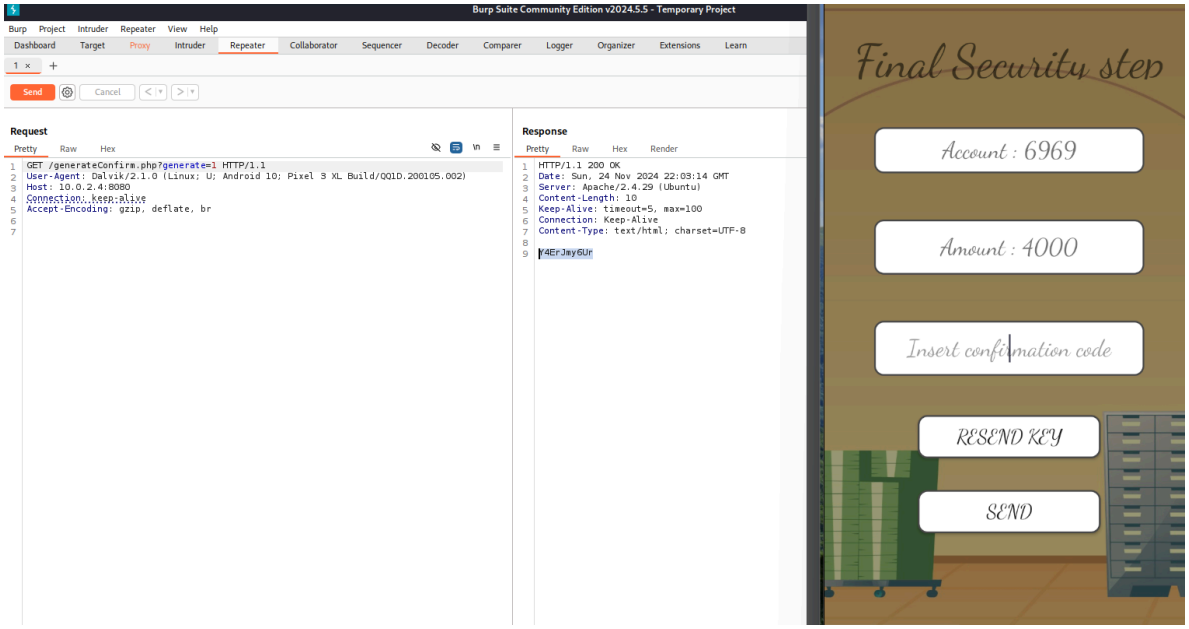
- I used ADB to install the modified APK on my Android device. This allowed me to test whether my changes successfully bypassed the transfer limit.

  adb connect 10.0.2.19 && adb install MobileBank3.apk

10. Use Burp Suite to intercept the traffic and resend the key.

I used Burp Suite to intercept requests

- To test the app's communication with the server, I configured Burp Suite as a proxy and captured the application's HTTP traffic. I modified requests to simulate various conditions and verified that the server processed transactions exceeding the original limit.



I completed a $4000 transfer

- After bypassing the restrictions, I successfully executed a $4000 transfer. The server responded as expected, confirming that the pentest objective was achieved.

11. Challenge complete.

Observations and Challenges

1. **Addressing server errors**
    - During testing, I encountered an error indicating that the bank was for students and had a $50 transfer limit. This message was located in the app's smali files and confirmed that my modifications were targeting the correct logic.
2. **Overcoming proxy conflicts**
    - Initially, there were issues with the proxy port configuration in Burp Suite. I resolved this by adjusting the port settings and ensuring that Docker and Burp Suite could coexist without conflicts.
3. **Ensuring network compatibility**
    - The Android device and Kali Linux machine needed to be on the same subnet for proper communication. I had to troubleshoot routing and IP assignment issues to ensure seamless connectivity.